MODERN BUSINESS ARITHMETIC. By H. A. Finney and J. C. Brown. Henry Holt and Company, New York, 1916. v + 298 pages.

PLANE AND SOLID GEOMETRY. By William Betz and Harrison E. Webb. With the editorial coöperation of Percy F. Smith. Ginn and Company, Boston, 1916. xii + 507 pages. $1.36.

BOOK REVIEWS.

Subjects for mathematical essays. By CHARLES DAVISON. Macmillan and Co., London, 1915. x + 160 pages. $1.90.

At the outset we may say that the book can be used to advantage as a collection of problems by any teacher of mathematics. This, however, is not the object suggested by the title or by the author in his preface. "The object of what are here called 'mathematical essays' is to coördinate a pupil's knowledge on certain subjects not specially dealt with in textbooks."

Some of the essays certainly give the opportunity for coördination, though the animadversion on textbooks seems not always just. On page 114 we find "State and prove the leading properties in the theory of determinants," and on page 115 "Discuss the principle of proportional parts as applied to mathematical tables." It is not necessary to assume that the 'pupils' are prepared to give presidential addresses to learned societies to explain the presence of these 'subjects.' The trade mark (Trin. 1910) reveals that the pupils are preparing for scholarship examinations where they will be met by a perfectly cynical examiner who throws in just such questions for the purpose of separating the candidates widely.

The essays are not all of this type however; they descend to quite elementary sets of coördinated examples. Among the ways of coördinating the field of elementary mathematics we can scarcely expect to find many of really fundamental interest. A few styles occurring here may be noticed.

Euler's product theorem, page 81, has this set:

1. Prove that

$$\sin\theta = 2^n \cos\frac{\theta}{2}\cos\frac{\theta}{2^2}\cos\frac{\theta}{2^3}\cdots\cos\frac{\theta}{2^n}\sin\frac{\theta}{2^n}.$$

2. Prove that

$$\lim_{n=\infty}\left(\cos\frac{\theta}{2}\cos\frac{\theta}{2^2}\cdots\cos\frac{\theta}{2^n}\right) = \sin\frac{\theta}{2}, \text{ etc.}$$

Here coördination apparently consists in taking the purely formal steps in the proof of a theorem and giving them as separate problems in the order required. If any object other than mnemonic is served it is hidden. The worst modern text would presumably say something about the convergence of an infinite product if only something wrong.

In "Euler's Polyhedron Theorem" (page 61) we have:

1. If a cube be constructed face by face, state the number of edges and vertices in the partially constructed figure for each value of F from 1 to 6.

2. Asks the pupil to prove Euler's theorem for any polyhedron.

Now by virtue of that peculiar psychological reaction which enabled the slave in the Platonic dialogue to give a Euclidean demonstration, which enables each bright student to satisfy the teacher unless he be ultra-socratic (and almost the only ultra-socratic teacher is the cold hard world) we may be reasonably certain that it will rarely happen that the cube is ever anything but a *Flächenstück* in the course of its construction, or that any polyhedron so improper as not to obey the theorem will be mentioned. The coördination in this case is of the classic type "the blind leading the blind."

Inevitably some obvious connections must be missed, but the omission in Ptolemy's theorem (page 78) of any reference to the theorem on a straight line seems to require explanation.

Occasionally hypotheses necessary to the conclusion are suppressed as in page 51, "Prove $x^3 + y^3 + z^3 > 3xyz$." These can be supplied by telepathy.

The first part of the work is almost entirely on pure mathematics, only one section bearing a title suggesting applications, and this "On the dip of a stratum" might as well have been "Napier's rule of circular parts." The second part contains in the scholarship papers a good deal of mechanics.

In spite of all that has been specially pleaded the book may well serve a useful purpose, mnemonically, and lay some foundations for broader coördinations. This is probably all the author expected. It should be serviceable to a teacher who desires problems not found in the usual run of American texts.

We note a few unimportant misprints, from which the book appears to be unusually free for a first edition. Page 21, line 15; page 46, line 9; page 81, line 2; page 120, line 15; page 124, line 12. The typography and makeup of the book are very good.

R. P. BAKER.

THE UNIVERSITY OF IOWA.

Plane and Spherical Trigonometry with Tables. By GEORGE WENTWORTH and DAVID EUGENE SMITH. Ginn and Co. 230+104 pages. $1.35.

The total content of this text is practically the same as that of the second revision of Wentworth's *Plane and Spherical Trigonometry,* the principal differences being the addition of a chapter on graphs and the omission of the chapter on "Applications of spherical trigonometry," contained in the older book. Moreover, the general treatment of the subject is the same and the proofs of the individual theorems are, in most cases, identical. In the matter of arrangement, however, the two texts differ materially.

In the present text the authors (as they state in the preface) have followed the rule of "putting the practical before the theoretical." To this end, after defining the trigonometric functions of acute angles, a large amount of space is devoted to problems illustrating the practical uses of each of them, first using natural functions and then logarithms. This covers 76 pages (including a chapter on logarithms) and it is not until page 82 that the student meets the definitions of the functions of angles greater than 90° and begins to get some insight into the